NOTES

PART 1: GENERAL

- A. WORK SHALL CONSIST OF FURNISHING AND CONSTRUCTING A VERDURA SEGMENTAL RETAINING WALL SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN CONFORMITY WITH THE LINES, GRADES, DESIGN AND DIMENSIONS SHOWN ON THESE PLANS.
- B. WORK INCLUDES PREPARING FOUNDATION SOIL, FURNISHING AND INSTALLING LEVELING PAD. PLANTABLE SOIL UNIT FILL, AND BACKFILL TO THE LINES AND GRADES SHOWN ON THE CONSTRUCTION DRAWINGS.
- C. WORK INCLUDES FURNISHING AND INSTALLING GEOSYNTHETIC SOIL REINFORCEMENT OF THE TYPE, SIZE, LOCATION, STRENGTH AND LENGTHS DESIGNATED ON THE CONSTRUCTION DRAWINGS.
- D. WORK INCLUDES FURNISHING AND INSTALLING FOUNDATION DRAIN, SUBDRAIN AND OTHER WALL-RELATED DRAINAGE SYSTEMS THAT MAY BE SHOWN ON THE CONSTRUCTION DRAWINGS.
- 1.02 REFERENCED DOCUMENTS AND TEST METHODS

A. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- 1) ASTM C-1372 SPECIFICATION FOR SEGMENTAL RETAINING WALL UNITS
- 2) ASTM D-6913 PARTICLE-SIZE DISTRIBUTION (GRADATION) OF SOILS
- 3) ASTM D-3080 DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS
- ASTM D-1557 LABORATORY COMPACTION CHARACTERISTICS OF SOIL MODIFIED PROCTOR 5) ASTM D-4318 LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS
- 6) ASTM D-4595 TENSILE PROPERTIES OF GEOTEXTILES WIDE WIDTH STRIP 7) ASTM D-5262 UNCONFINED TENSION CREEP BEHAVIOR OF GEOSYNTHETICS
- 8) ASTM D-3034 POLYVINYL CHLORIDE PIPE (PVC)
- 9) ASTM D-4829 EXPANSION INDEX OF SOILS
 10) ASTM C-140 STD. SPEC. FOR SAMPLING AND TESTING CONCRETE MASONRY UNITS
- 11) ASTM C-90 STD. SPEC. FOR SOLID LOAD BEARING CONCRETE MASONRY UNITS 12) ASTM D-4632 GRAB BREAKING LOAD AND ELONGATION OF GEOTEXTILES
- 14) ASTM D-4833 INDEX PUNCTURE RESISTANCE OF GEOTEXTILES
- 15) ASTM D-4491 WATER PERMEABILITY OF GEOTEXTILES BY PERMATIVITY 16) ASTM D-3786 HYDRAULIC BURSTING STRENGTH OF TEXTILE FABRICS
- B. GEOSYNTHETIC RESEARCH INSTITUTE (GRI)
 - 1) GRI-GG4-DETERMINATION OF LONG TERM DESIGN STRENGTH OF GEOGRIDS
- 2) GRI-GG5-DETERMINATION OF GEOGRID (SOIL) PULLOUT
- C. U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION
 - 1) AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION (2010) 2. CALIFORNIA AMENDMENTS TO THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (FOURTH EDITION), DATED SEPTEMBER 2010
- 1.03 SUBMITTALS/CERTIFICATION
 - A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.
- 2.01 MODULAR CONCRETE RETAINING WALL UNITS
 - A. MODULAR CONCRETE UNITS SHALL BE VERDURA, AS INDICATED IN TABLE 2.
 - B.MODULAR CONCRETE MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C1372 STANDARD
 - C.MODULAR CONCRETE UNITS SHALL CONFORM TO THE FOLLOWING STRUCTURAL AND GEOMETRIC REQUIREMENTS MEASURED IN ACCORDANCE WITH SECTION 1.03 AND OTHER APPROPRIATE REFERENCES:

 * COMPRESSIBLE STRENGTH = 4000 PSI (27,000 KPA) MINIMUM AT 28 DAYS;

 - MOISTURE ABSORPTION = 6% MAXIMUM FOR STANDARD WEIGHT AGGREGATES;

 - * BATTER = AS INDICATED IN TABLE 2.

 * DIMENSIONAL TOLERANCES = ±1/8" (3mm) FROM NOMINAL UNIT DIMENSIONS (NOT INCLUDING EXPOSED AGGREGATE FACE TEXTURE), ±1/8" (3mm) UNIT HEIGHT TOP AND BOTTOM PLANES.
- 2.02 GEOSYNTHETIC-CONCRETE BLOCK CONNECTORS
 - A. CONNECTORS SHALL BE 1 INCH (25.4 mm) DIAMETER OR GREATER SCHEDULE 80 PIPE OR EQUIVALENT AND MUST BE CAPABLE OF PROVIDING POSITIVE MECHANICAL INTERLOCK BETWEEN GEOSYNTHETIC SOIL REINFORCEMENT MATERIAL (GEOGRID) AND BLOCK.
 - B. CONNECTORS SHALL BE CAPABLE OF HOLDING THE GEOSYNTHETIC SOIL REINFORCEMENT IN THE PROPER DESIGN POSITION DURING GEOSYNTHETIC PRE-TENSIONING AND BACKFILLING PROCEDURES
- 2.03 BASE LEVELING PAD MATERIAL
 - A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.
- 2.04 UNIT FILL
 - A. UNIT FILL SHALL CONSIST OF SOILS USED FOR WALL BACKFILL OR AS SPECIFIED WITHIN THE CONTRACT DOCUMENTS. UNIT FILL MATERIALS ARE DEFINED AS THOSE THAT ARE WITHIN THE BLOCK FACIA UNITS.
- 2.05 SOIL BACKFILL
 - A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.
- 2.06 GEOGRID SOIL REINFORCEMENT
 - A. GEOSYNTHETIC REINFORCEMENT SHALL BE OF THE TYPE SHOWN ON THESE DESIGN PLANS. THE CONTRACTOR, OR THE SUPPLIER AS HIS AGENT, SHALL FURNISH THE GEOTECHNICAL ENGINEER OF RECORD WITH A CERTIFICATE OF COMPLIANCE CERTIFYING THAT THE GEOSYNTHETIC REINFORCEMENT COMPLIES WITH THIS SECTION OF THE SPECIFICATIONS, THE DRAWINGS AND THE DESIGN CALCULATIONS.
- - A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS

VERDURA RETAINING WALL STANDARD PLANS

2.08 FILTER FABRIC

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

2.09 FILTER MATERIAL

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

PART 3: EXECUTION

3.01 SURFACE CONDITIONS

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.02 LAYOUT

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.03 SUBSURFACE DRAINAGE SYSTEM INSTALLATION

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.04 EXCAVATION

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.05 BASE LEVELING PAD

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

- A. FIRST COURSE OF UNITS SHALL BE PLACED ON THE LEVELING PAD AT THE APPROPRIATE LINES AND GRADES. MOLDED SURFACE OF MODULAR UNITS SHALL BE USED FOR ALIGNMENT. ALIGNMENT AND LEVEL SHALL BE CHECKED IN ALL DIRECTIONS AND ENSURE THAT ALL UNITS ARE IN FULL CONTACT WITH THE LEVELING PAD AND PROPERLY SEATED.
- B. UNITS SHALL BE PLACED ON THE LEVELING PAD WITH A MAXIMUM DISTANCE OF 9 INCHES (228 mm) BETWEEN ADJACENT UNITS. THE SPACING BETWEEN UNITS INSTALLED IN CURVED REGIONS (CONCAVE OR CONVEX) MUST BE ADJUSTED ACCORDINGLY AND SUCH THAT THE RUNNING BOND LAYOUT IS MAINTAINED. THE RUNNING BOND LAYOUT IS ENSURING THAT THE STAGGERED BLOCKS SHALL BE CENTERED ON UNITS ABOVE AND BELOW. ALL BLOCK LAYOUT AND PLACEMENT SHALL BE IN ACCORDANCE WITH THESE PLANS AND PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.
- C. MODULAR UNITS MAY BE INSTALLED HORIZONTALLY WITH RESPECT TO THE PROFILE WALL ALIGNMENT OR MAY BE MADE TO FOLLOW THE BOTTOM OF WALL CONTOURS ARE USED TO SET THE FIRST ROW OF MODULAR BLOCKS, GRADES MAY NOT SLOPE MORE THAN 15% WITH RESPECT TO THE HORIZONTAL PLANE. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS FOR ALIGNMENT.
- D. PLACE UNIT FILL WITHIN AND BETWEEN WALL UNITS. OVERFILL AND COMPACT UNIT FILL WITH NON-MECHANICAL METHODS (IE. FOOT STOMPING, ETC.), UNIT FILL SHOULD BE FIRM, NO MINIMUM RELATIVE COMPACTION REQUIRED FOR THE UNIT FILL.
- F EXCESS UNIT FILL MUST BE SCREEDED (ROD-BOARDED) OFF TO DEVELOP A FLAT BASE UPON WHICH SUBSPOLIENT UNITS CAN BE POSITIONED. SCREEDED SURFACE SHALL PARTIALLY EXPOSE RAIL OF BLOCK. IF UNIT FILL HAS SIGNIFICANT VOID SPACES FILL AND LEVEL AS REQUIRED.
- F. IF GEOGRID IS REQUIRED AT THIS BLOCK COURSE, CLEAR UNIT FILL MATERIAL FROM NOTCH IN THE BLOCK AND INSTALL GEOGRID AS PER DETAILS AND SECTION 3.07 D OF THESE PLANS.
- G. PLACE AND ALIGN NEXT BLOCK COURSE. MAXIMUM STACKED VERTICAL HEIGHT OF WALL UNITS PRIOR TO UNIT FILL AND REINFORCED SOIL PLACEMENT AND COMPACTION SHALL NOT EXCEED ONE COURSE. FOLLOW WALL ERECTION AND UNIT FILL CLOSELY WITH STRUCTURE BACKFILL.
- 3.07 GEOSYNTHETIC SOIL REINFORCEMENT INSTALLATION
 - A. GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE ORIENTED WITH THE HIGHEST STRENGTH AXIS PERPENDICULAR TO THE WALL
 - B. GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE PLACED AT THE STRENGTHS, LENGTHS, AND ELEVATIONS SHOWN ON THESE DRAWINGS. WHERE GEOSYNTHETIC PLACEMENT ELEVATIONS VARY FROM FACING UNIT INCREMENTS, GEOSYNTHETIC ELEVATIONS MAY BE ADJUSTED UP OR DOWN BY 4 INCHES (101 mm).
 - C. WITHIN THE REINFORCED SOIL ZONE, THE GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE LAID HORIZONTALLY ON COMPACTED FILL. THE GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE LAID FLAT PRIOR TO ADDITIONAL FILL PLACEMENT.
 - D. ATTACH GEOSYNTHETIC REINFORCEMENT TO THE MODULAR BLOCK WALL UNITS IN ACCORDANCE WITH THE DETAILS OF THESE PLANS AND SPECIFICATIONS. PLACE GEOSYNTHETIC REINFORCEMENT OVERLAP SO THAT IT OVERHANGS THE FACE OF THE WALL. INSERT SOLID 1" DIA. SCHEDULE 80 PVC CONNECTOR PIPE INTO THE NOTCH IN THE BLOCK BELOW, OVERLAP THE GEOSYNTHETIC REINFORCEMENT ONTO THE PIPE AND STEP INTO PLACE TO SECURE THE OVERLAPPING GEOSYNTHETIC CONNECTION. PULL THE GEOSYNTHETIC CONNECTION. PULL THE GEOSYNTHETIC OVERLAP TIGHT AND INSTALL NEXT BLOCK COURSE ON TOP TO HOLD GEOSYNTHETIC CONNECTION IN PLACE.
 - E. GEOSYNTHETIC SOIL REINFORCEMENT SHALL BE CONTINUOUS THROUGHOUT THE EMBEDDED LENGTH. SPLICED CONNECTIONS BETWEEN SHORTER PIECES OF GEOSYNTHETIC REINFORCEMENT TO MAKE LONGER PIECES WILL NOT BE PERMITTED.
- 3.08 REINFORCED BACKFILL PLACEMENT

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.09 EROSION CONTROL

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.10 AS-BUILT CONSTRUCTION TOLERANCES

A. VERTICAL ALIGNMENT: ±1.5 INCHES (37 mm) OVER ANY DISTANCE.

B. WALL BATTER: WITHIN 2 DEGREES OF DESIGN BATTER

C. HORIZONTAL ALIGNMENT: ±1.5 INCHES (37 mm) OVER ANY 10 FT (3 M) DISTANCE.

D. CORNERS, BENDS, CURVES: ±1 FT (0.3 M) TO DESIGN LOCATIONS

E. MAXIMUM HORIZONTAL GAP BETWEEN ERECTED UNITS SHALL BE 9 INCHES (228 mm).

F. FIELD INSPECTION AND TESTING SHALL BE PERFORMED PER PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.

3.11 FIELD QUALITY CONTROL

A. REFER TO PROJECT REQUIREMENTS IN THE CONTRACT DOCUMENTS.





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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	WALL #
××	xxx	××	xxx/xxx	××

TABLE 1 - REFERENCE DOCUMENTATION:

TABLE 2 - VERDURA BLOCK PROPERTIES

Unit Size, Rail Height, in. (mm) Unit Size, Crown Height, in. (mm)
Unit Size, Width, in. (mm)
Unit Size, Depth, in. (mm)

Weight, (type.), lbs. (N) Batter = (degrees from vertical)

TABLE 3 - SOIL STRENGTH REQUIREMENTS

riction Anale (

34 MIN.

30 MIN.

THE CALTRANS SPECIAL PROVISIONS (AS NOTED BELOW)

PARTICLE SIZE PERCENT PASSING

50-100

0-30 0-15

30 MIN.

Unit Type, Verdura

MATERIAL

*Reinforced Soil

Retained Soil

SIEVE

2 INCH

Foundation Soil

SAND EQUILIVANT ≥ 30 PLASTICITY INDEX ≤ 6

SOIL ph FROM 4.5 TO 9

50 mm

4-75 mm

425 um

1.) VERDURA RETAINING WALL DESIGN PER LRFD, PROPRIETARY SRW RETAINING WALL

SYSTEM SUBMITTAL FOR PRE-APPROVAL WITH CAL-TRANS PREPARED BY SOIL RETENTION DESIGNS INC. DATED: OCTOBER 22, 2010

Cohesion(kPa

REINFORCED / INFILL SOIL SHALL SATISFY MINIMUM GRADATION AND PLASTICITY REQUIREMENTS OF

REGISTERED CIVIL ENGINEER DATE

X-X-X PLANS APPROVAL DATE The State of California or its officers or agents shall not be responsible for the accuracy or

No. 64108 (2) (2) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
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CALTRANS STANDARD DETAILS

GENERAL NOTES

VERDURA RETAINING WALL PLANS OF 7 SH

TABLE 4 - GEOSYNTHETIC REINFORCEMENT PROPERTIES

8xT 20XT

(200)

ASTM lbs/ft 7400 D6637 (kN/m) (108)

GRI GC-4 (kN/m) (56.5)

METHOD UNIT

	CASE 1 DESIGN CHART— VERDURA [®] 40 RETAINING WALL— LEVEL TOP WITH TRAFFIC SURCHARGE AND BARRIER										
COLUMN #1	COLUMN #2	COLUMN #3	COLUMN #3 COLUMN #4 COLUMN #5 COLUMN #6 COLUMN #6 GEOGRID REINFORCEMENT TYPE BLOCK SPACING BETWEEN REINFORCEMENT LAYER NUM			R NUMBER					
TOTAL HEIGHT H TOT (FT)	EXPOSED HEIGHT H' (FT)	EMBEDED DEPTH H EMB (FT)	REINFORCEMENT LENGTH L (FT)	NUMBER OF REINFORCEMENT LAYERS	MIRAGRID 8XT GEOGRID PER LAYER NUMBER	MIRAGRID 20XT GEOGRID PER LAYER NUMBER	1 BLOCK SPACING	2 BLOCK SPACING	3 BLOCK SPACING	FROM THE CREST	
< 6	4 OR LESS	2	8	(MINIMUM 2)	ALL LAYERS	N/A	LAYER #1	N/A	LAYER #2	MAXIMUM 4 COURSES	
8	6	2	8	4	ALL LAYERS	N/A	LAYER #1	LAYER #4	LAYERS #2 THROUGH #3	MAXIMUM 4 COURSES	
10	8	2	8	5	ALL LAYERS	N/A	LAYER #1	LAYER #5	LAYERS #2 THROUGH #4	MAXIMUM 4 COURSES	
12	10	2	9	6	ALL LAYERS	N/A	LAYER #1	LAYER #6	LAYERS #2 THROUGH #5	MAXIMUM 4 COURSES	
14	12	2	9.8	7	ALL LAYERS	N/A	LAYER #1	LAYER #7	LAYERS #2 THROUGH #6	MAXIMUM 4 COURSES	
16	14	2	11.2	8	ALL LAYERS	N/A	LAYER #1	LAYER #8	LAYERS #2 THROUGH #7	MAXIMUM 4 COURSES	
18	16	2	12.6	9	ALL LAYERS	N/A	LAYER #1	LAYER #9	LAYERS #2 THROUGH #8	MAXIMUM 4 COURSES	
20	18	2	14	10	ALL LAYERS	N/A	LAYER #1	LAYER #10	LAYERS #2 THROUGH #9	MAXIMUM 4 COURSES	
22	19.8	2.2	15.4	11	ALL LAYERS	N/A	LAYER #1	LAYER #11	LAYERS #2 THROUGH #10	MAXIMUM 4 COURSES	
24	21.6	2.4	16.8	12	LAYERS #3 THROUGH #12	LAYERS #1 & #2	LAYER #1	LAYER #12	LAYERS #2 THROUGH #11	MAXIMUM 4 COURSES	
26	23.4	2.6	18.2	13	LAYERS #4 THROUGH #13	LAYERS #1 THROUGH #3	LAYER #1	LAYER #13	LAYERS #2 THROUGH #12	MAXIMUM 4 COURSES	
28	25.2	2.8	19.6	14	LAYERS #5 THROUGH #14	LAYERS #1 THROUGH #4	LAYER #1	LAYER #14	LAYERS #2 THROUGH #13	MAXIMUM 4 COURSES	
30	27	3.0	21	15	LAYERS #6 THROUGH #15	LAYERS #1 THROUGH #5	LAYER #1	LAYER #15	LAYERS #2 THROUGH #14	MAXIMUM 4 COURSES	

NOTE: FOR WALLS GREATER THAN 30' SEE MAXIMUM 30'-40' TOTAL HEIGHT DESIGN

NOTES:

- 1) GEOGRID LENGTHS ARE MEASURED FROM THE POINT OF CONNECTION
- 2) ALL IRRIGATION LINES ARE TO BE INSTALLED ALONG THE FACE OF THE WALL. REFER TO PROJECTS REQUIREMENTS WITHIN THE CONSTRUCTION DOCUMENTS FOR IRRIGATION DETAILS

DESIGN NOTES:

- 1) FOR DESIGN WALL HEIGHTS NOT DEPICTED IN THE TABLE USE LARGER WALL HEIGHT DESIGN CASE FROM THE TABLE. EXAMPLE: FOR A 12.1 FT WALL USE THE 14 FT DESIGN CASE.
- 2) WHERE THE MINIMUM NUMBER OF REQUIRED GEOGRIDS FOR THE LARGER WALL HEIGHT DESIGN DOES NOT FIT WITHIN THE DESIGN WALL HEIGHT, USE A CLOSER GEOGRID SPACING AS NECESSARY TO FIT ALL REQUIRED GEOGRIDS WITHIN THE DESIGN HEIGHT.
- 3) TOTAL HEIGHT DESIGN IN COLUMN #1 ACCOMMODATES BARRIER AND SURCHARGE LOADING. ROAD GRADE ELEVATION EQUALS TW ELEVATION+10" MAX.





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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT XXX/XXX	WALL #	PROFESS IONA
REGISTER	ED CIVIL EN	GINEER X-X	X/X/X DATE		PROFESSIONA PROFE
	The State	APPROVAL of California of e responsible		FOF CALIFORN	

CALTRANS STANDARD DETAILS

CASE I DESIGN

MAXIMUM 30' TOTAL HEIGHT

VERDURA® RETAINING WALL PLANS OF __7_ SH

2



COLUMN #1

36

38

COLUMN #2

30.6

32.4

34.2

COLUMN #3

MBEDED DEPTH H EMB (FT)

3.4

3.6

3.8

4.0

COLUMN #4

22.4

23.8

25.2

26.6

COLUMN #5

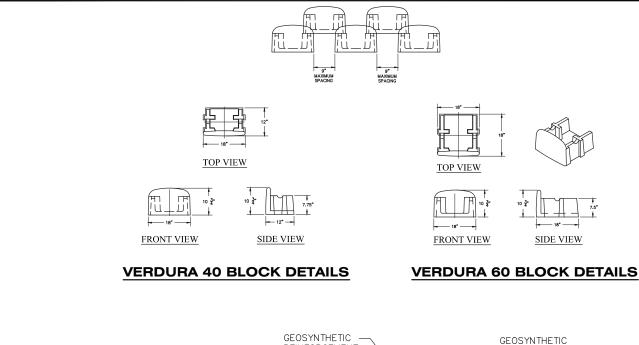
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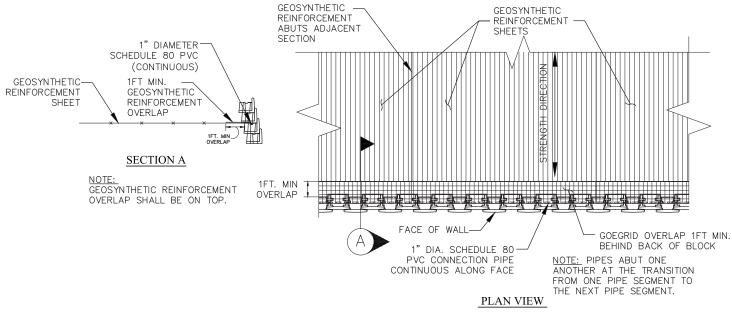
COLUMN #6

30

30

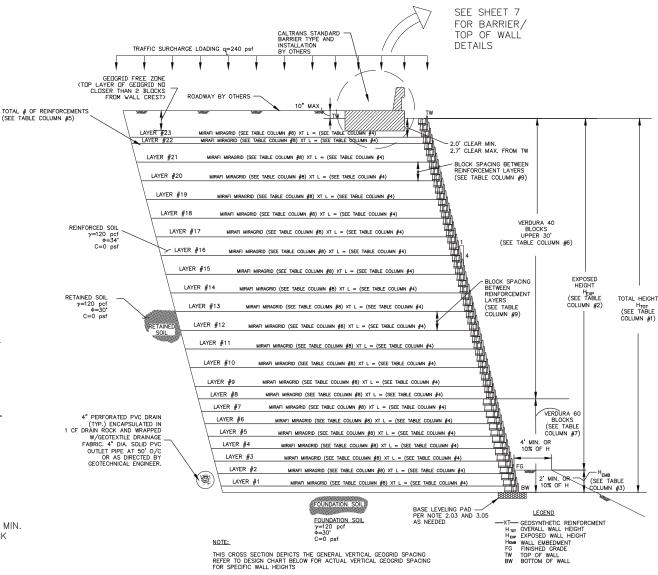
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VERDURA GEOGRID CONNECTION DETAIL

COLUMN #7



TYPICAL CROSS SECTION - CASE I

NOTES:

- 1) GEOGRID LENGTHS ARE MEASURED FROM THE POINT OF CONNECTION
- 2) ALL IRRIGATION LINES ARE TO BE INSTALLED ALONG THE FACE OF THE WALL. REFER TO PROJECTS REQUIREMENTS WITHIN THE CONSTRUCTION DOCUMENTS FOR IRRIGATION DETAILS

DESIGN NOTES:

- 1) FOR DESIGN WALL HEIGHTS NOT DEPICTED IN THE TABLE USE LARGER WALL HEIGHT DESIGN CASE FROM THE TABLE. EXAMPLE: FOR A 12.1 FT WALL USE THE 14 FT DESIGN CASE.
- 2) WHERE THE MINIMUM NUMBER OF REQUIRED GEOGRIDS FOR THE LARGER WALL HEIGHT DESIGN DOES NOT FIT WITHIN THE DESIGN WALL HEIGHT, USE A CLOSER GEOGRID SPACING AS NECESSARY TO FIT ALL REQUIRED GEOGRIDS WITHIN THE DESIGN HEIGHT
- 3) TOTAL HEIGHT DESIGN IN COLUMN #1 ACCOMMODATES BARRIER AND SURCHARGE LOADING. ROAD GRADE ELEVATION EQUALS TW ELEVATION+10" MAX.



MIRAGRID 8XT GEOGRID PER LAYER (#) W/ V40 BLOCK

LAYERS #8 THROUGH #17

LAYERS #9 THROUGH #18

CASE 1 DESIGN CHART® VERDURA 40/60 RETAINING WALL- LEVEL TOP WITH TRAFFIC SURCHARGE AND BARRIER

COLUMN #8
GEOGRID REINFORCEMENT TYPE

MIRAGRID 20XT GEOGRID
PER LAYER (#) W/ V40
BLOCK

LAYERS #12 THROUGH #21 LAYERS #7 THROUGH #11 LAYERS #1 THROUGH #6

PER LAYER (#) W/ V60 1 BLOCK SPACING

LAYER #1

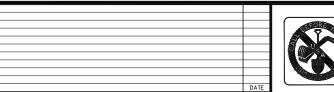
LAYER #1

LAYERS #1 & #2

LAYERS #4 THROUGH #8 LAYERS #1 THROUGH #3

LAYERS #11 THROUGH #20 LAYERS #6 THROUGH #10 LAYERS #1 THROUGH #5 LAYERS #1 & #20

LAYERS #14 THROUGH #23 LAYERS #9 THROUGH #13 LAYERS #1 THROUGH #8 LAYERS #1 & #23





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COLUMN #9
BLOCK SPACING BETWEEN REINFORCEMENT LAYER NUMBER

LAYERS #4 THROUGH #16

MAXIMUM 4 COURSES

MAXIMUM 4 COURSES

MAXIMUM 4 COURSES

LAYERS #5 THROUGH #17

LAYERS #7 THROUGH #19

LAYERS #9 THROUGH #20

LAYERS #10 THROUGH #22

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	WALL #			
××	xxx	××	xxx/xxx	××			
REGISTERED CIVIL ENGINEER DATE X-X-X							
PLANS APPROVAL DATE							
The State of California or its officers or agents shall not be responsible for the accuracy or							



CALTRANS STANDARD DETAILS **CASE I DESIGN** 30' TO 40' TOTAL HEIGHT

VERDURA[®]RETAINING WALL PLANS OF <u>7</u> SH

3



2 BLOCK SPACING

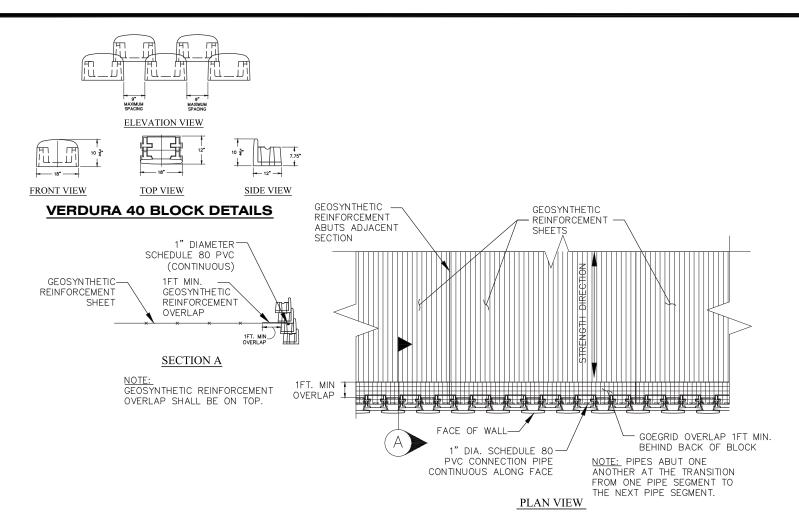
LAYERS #2 & #3

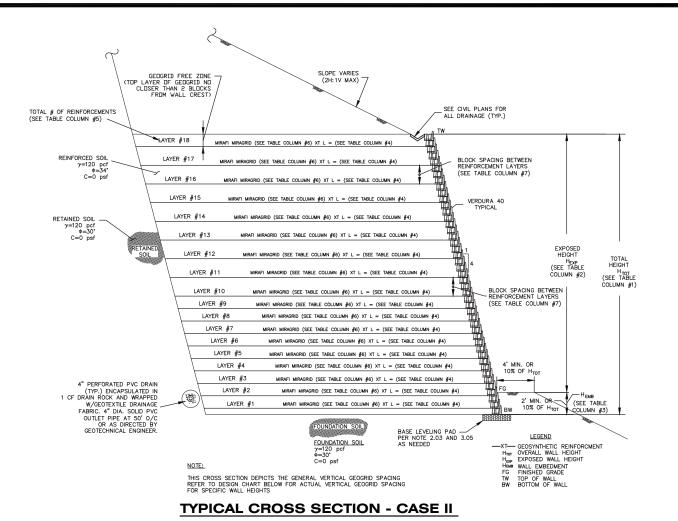
LAYERS #2 THROUGH #4 & #18

LAYERS #2 THROUGH #6

LAYERS #2 THROUGH #8 & #21

LAYERS #2 THROUGH #9





VERDURA CONNECTION DETAIL

CASE 2 DESIGN CHART— VERDURA 40 [®] RETAINING WALL— 2:1 ASCENDING SLOPE										
COLUMN #1	COLUMN #2	COLUMN #3	COLUMN #4	COLUMN #5	COLUMI GEOGRID REINFOR		COLUMN #7 BLOCK SPACING BETWEEN REINFORCEMENT LAYER NUMBER			ER
TOTAL HEIGHT H TOT (FT)	EXPOSED HEIGHT H' (FT)	EMBEDED HEIGHT H EMB (FT)	REINFORCEMENT LENGTH L (FT)	NUMBER OF REINFORCEMENT LAYERS	MIRAGRID 8XT GEOGRID PER LAYER (#)	MIRAGRID 20XT GEOGRID PER LAYER (#)	1 BLOCK SPACING	2 BLOCK SPACING	3 BLOCK SPACING	FROM THE CREST
< 6	4 OR LESS	2	8	3 (MINIMUM 2)	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 & #3	MAXIMUM 2 COURSES
8	6	2	8	4	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 THROUGH #4	MAXIMUM 2 COURSES
10	8	2	10	5	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 THROUGH #5	MAXIMUM 2 COURSES
12	10	2	10	6	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 THROUGH #6	MAXIMUM 2 COURSES
14	12	2	12	7	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 THROUGH #7	MAXIMUM 2 COURSES
16	14	2	13.5	8	ALL LAYERS	N/A	LAYER #1	N/A	LAYERS #2 THROUGH #8	MAXIMUM 2 COURSES
18	16	2	15	9	LAYERS #3 THROUGH #9	LAYERS #1 & #2	LAYER #1	N/A	LAYERS #2 THROUGH #9	MAXIMUM 2 COURSES
20	18	2	17	10	LAYERS #4 THROUGH #10	LAYERS #1 THROUGH #3	LAYER #1	N/A	LAYERS #2 THROUGH #10	MAXIMUM 2 COURSES
22	19.8	2.2	18.5	11	LAYERS #6 THROUGH #11	LAYERS #1 THROUGH #5	LAYER #1	N/A	LAYERS #2 THROUGH #11	MAXIMUM 2 COURSES
24	21.6	2.4	20.5	13	LAYERS #8 THROUGH #13	LAYERS #1 THROUGH #7	LAYER #1	LAYERS #2 THROUGH #4	LAYERS #5 THROUGH #13	MAXIMUM 2 COURSES
26	23.4	2.6	22	15	LAYERS #11 THROUGH #15	LAYERS #1 THROUGH #10	LAYER #1	LAYERS #2 THROUGH #7	LAYERS #8 THROUGH #15	MAXIMUM 2 COURSES
28	25.2	2.8	24	16	LAYERS #12 THROUGH #16	LAYERS #1 THROUGH #11	LAYER #1	LAYERS #2 THROUGH #7	LAYERS #8 THROUGH #16	MAXIMUM 2 COURSES
30	27	3.0	25.5	19	LAYERS #15 THROUGH #19	LAYERS #1 THROUGH #14	LAYERS #1 & #2	LAYERS #3 THROUGH #12	LAYERS #13 THROUGH #19	MAXIMUM 2 COURSES
30	27	3.0	25.5	19	LATERS #15 IHROUGH #19	LATERS #1 IHROUGH #14	LATERS #1 & #2	LATERS #3 IHROUGH #12	LATERS #13 IHROUGH #19	MAXIMUM 2 COURSES

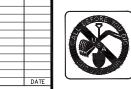
NOTES:

- 1) GEOGRID LENGTHS ARE MEASURED FROM THE POINT OF CONNECTION
- 2) ALL IRRIGATION LINES ARE TO BE INSTALLED ALONG THE FACE OF THE WALL. REFER TO PROJECTS REQUIREMENTS WITHIN THE CONSTRUCTION DOCUMENTS FOR IRRIGATION DETAILS

DESIGN NOTES:

- 1) FOR DESIGN WALL HEIGHTS NOT DEPICTED IN THE TABLE USE LARGER WALL HEIGHT DESIGN CASE FROM THE TABLE. EXAMPLE: FOR A 12.1 FT WALL USE THE 14 FT DESIGN CASE.
- 2) WHERE THE MINIMUM NUMBER OF REQUIRED GEOGRIDS FOR THE LARGER WALL HEIGHT DESIGN DOES NOT FIT WITHIN THE DESIGN WALL HEIGHT, USE A CLOSER GEOGRID SPACING AS NECESSARY TO FIT ALL REQUIRED GEOGRIDS WITHIN THE DESIGN HEIGHT.

NOTE: FOR WALLS GREATER THAN 30' SEE MAXIMUM 30'-40' TOTAL HEIGHT DESIGN





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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	WALL #		
××	xxx	××	xxx/xxx	××	ı	
REGISTERED CIVIL ENGINEER X/X/X X-X-X PLANS APPROVAL DATE						
The State of California or its officers or agents						

No. 84108 EXP.12/31/12

CALTRANS STANDARD DETAILS

CASE II DESIGN
MAXIMUM 30' TOTAL HEIGHT

VERDURA RETAINING WALL PLANS OF 7 SHTS.



COLUMN #2

H' (FT)

28.8

30.6

32.4

34.2

36

32

COLUMN #3

H EMB (FT)

3.2

3.4

3.6

3.8

4.0

COLUMN #5

LAYERS

21

25

28

35

REINFORCEMEN

LENGTH (FT)

27

29

30.5

32.5

34

HEIGHT OF ÆRDURA 40

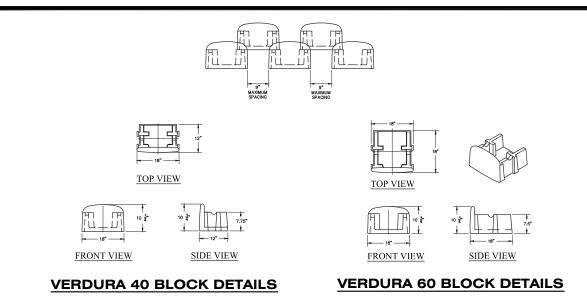
BLOCKS (FT)

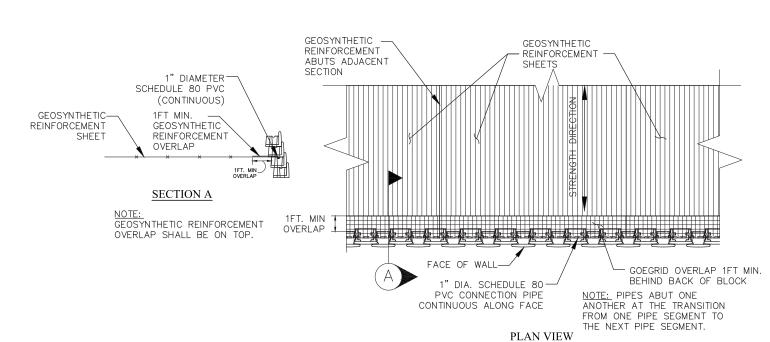
30

30

HEIGHT OF

BLOCKS (FT)





VERDURA CONNECTION DETAIL

PER LAYER (#) W/ V40 BLOCK

N/A

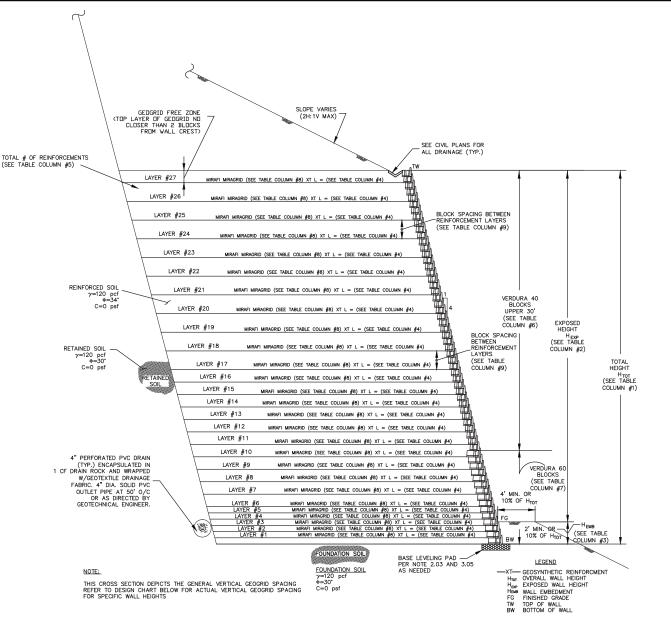
CASE 2 DESIGN CHART- VERDURA 40/60 RETAINING WALL- 2:1 ASCENDING SLOPE

MIRAGRID 20XT GEOGRID
PER LAYER (#) W/ V40
BLOCK
BLOCK
BLOCK

LAYERS #18 THROUGH #21 LAYERS #4 THROUGH #17 LAYERS #1 THROUGH #3 LAYERS #1 THROUGH #4

AYERS #23 THROUGH #25 LAYERS #7 THROUGH #22 LAYERS #1 THROUGH #6 LAYERS #1 THROUGH #8

LAYERS #10 THROUGH #28 LAYERS #1 THROUGH #9 LAYERS #1 THROUGH #10 L



TYPICAL CROSS SECTION - CASE II

NOTES:

- 1) GEOGRID LENGTHS ARE MEASURED FROM THE POINT OF CONNECTION
- 2) ALL IRRIGATION LINES ARE TO BE INSTALLED ALONG THE FACE OF THE WALL. REFER TO PROJECTS REQUIREMENTS WITHIN THE CONSTRUCTION DOCUMENTS FOR IRRIGATION DETAILS

DESIGN NOTES:

POST MILES TOTAL PROJECT

xxx/xxx

- 1) FOR DESIGN WALL HEIGHTS NOT DEPICTED IN THE TABLE USE LARGER WALL HEIGHT DESIGN CASE FROM THE TABLE. EXAMPLE: FOR A 12.1 FT WALL USE THE 14 FT DESIGN CASE.
- 2) WHERE THE MINIMUM NUMBER OF REQUIRED GEOGRIDS FOR THE LARGER WALL HEIGHT DESIGN DOES NOT FIT WITHIN THE DESIGN WALL HEIGHT, USE A CLOSER GEOGRID SPACING AS NECESSARY TO FIT ALL REQUIRED GEOGRIDS WITHIN THE DESIGN HEIGHT.



1 BLOCK SPACING

LAYERS #13 THROUGH #31 LAYERS #1 THROUGH #12 LAYERS #1 THROUGH #14 LAYERS #15 THROUGH #24 LAYERS #25 THROUGH #31 MAXIMUM 2 COURSES

LAYERS #16 THROUGH #35 LAYERS #1 THROUGH #15 LAYERS #1 THROUGH #18 LAYERS #19 THROUGH #29 LAYERS #30 THROUGH #35 MAXIMUM 2 COURSES



3 BLOCK SPACING

LAYERS #5 THROUGH #13 LAYERS #14 THROUGH #21 MAXIMUM 2 COURSES

LAYERS #9 THROUGH #18 LAYERS #19 THROUGH #25 MAXIMUM 2 COURSE

AYERS #11 THROUGH #22 LAYERS #23 THROUGH #28 MAXIMUM 2 COURSES

COLUMN #9
BLOCK SPACING BETWEEN REINFÖRCEMENT LAYER NUMBER

EGISTERED	CIVIL ENGINEER	X/X/X DATE	
	X-X-X PLANS APPROVAL	DATE	
	The State of California or shall not be responsible f		-

ROUTE

xxx xx

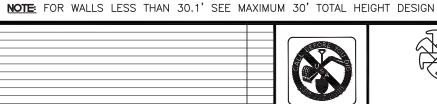


CASE II DESIGN 30' TO 40' TOTAL HEIGHT

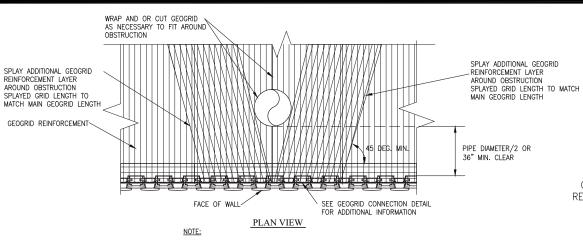
CALTRANS STANDARD DETAILS

VERDURA RETAINING WALL PLANS OF <u>7</u> SH

5



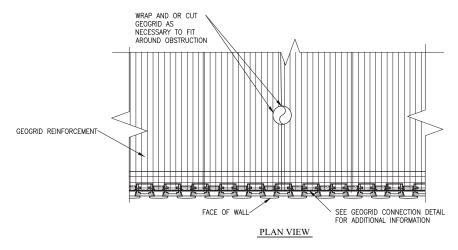
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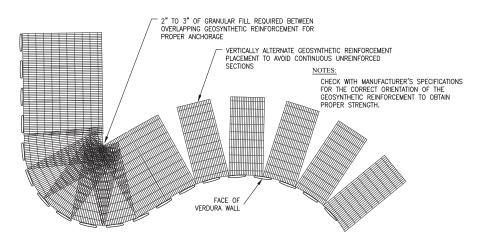
1. SPLAYED GRID LAYER IS TO BE PLACED 1 BLOCK COURSE ABOVE / BELOW MAIN GEOGRID REINFORCING LAYER

2. PIPE PROTRUSION SHALL BE PLACED A MINIMUM DISTANCE AWAY FROM THE BACK OF BLOCK EQUAL TO THE PIPE DIAMETER/2 OR 36" WHICHEVER IS GREATER.

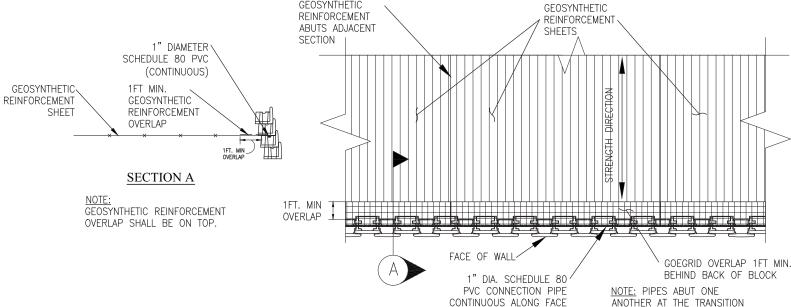
GEOGRID OBSTRUCTION DETAIL FOR PROTRUSIONS >36"



GEOGRID OBSTRUCTION DETAIL FOR PROTRUSIONS <36"

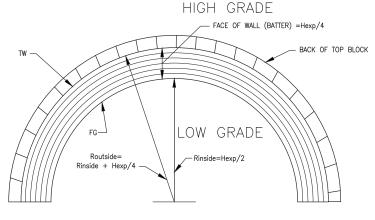


GEOGRID PLACEMENT ON CURVES



GEOSYNTHETIC

GEOGRID CONNECTION DETAIL



PLAN VIEW

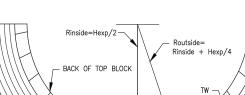
LEGEND

NOTES:

1. TIGHTER RADIUS CURVES CAN BE ACHIEVED BY VARYING THE SPACING BETWEEN THE BLOCKS. THE MAXIMUM SPACING OF THE BLOCKS SHALL BE 9" AND THE MINIMUM SPACING OF THE BLOCK SHALL NOT BE LESS THAN 4".

2. THE MINIMUM INSIDE RADIUS SHALL NOT BE LESS THAN THE EXPOSED HEIGHT DIVIDED BY 2, HEXP/2, OR 5 FT.

TYPICAL CONCAVE CURVE DETAIL



HIGH GRADE

PLAN VIEW

FACE OF WALL (BATTER)=Hexp/4 LOW GRADE

FROM ONE PIPE SEGMENT TO THE NEXT PIPE SEGMENT.

PLAN VIEW

LEGEND:
Hexp = EXPOSED HEIGHT
Rinside = INSIDE RADIUS
Routside = OUTSIDE RADIUS

TYPICAL CONVEX CURVE DETAIL



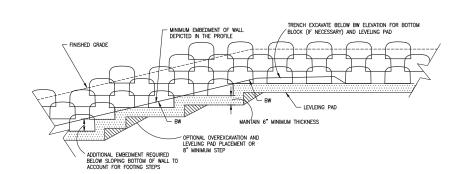


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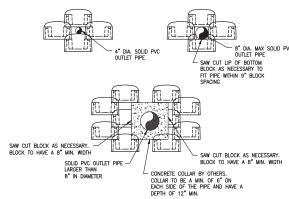
т	COUNTY	ROUTE	POST MILES TOTAL PROJECT	WALL #	
<	xxx	××	xxx/xxx	××	ı
STERED CIVIL ENGINEER DATE X-X-X					
PLANS APPROVAL DATE					

O CIVIL ENGINEER X/X/X DATE	No. 64108
X-X-X PLANS APPROVAL DATE	EXP.12/31/12
The State of California or its officers or agents shall not be responsible for the accuracy or	OF CALIFO

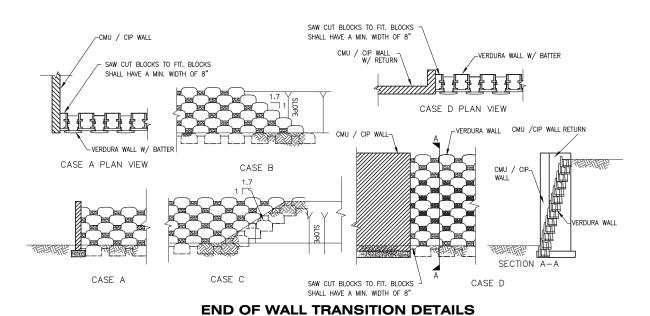
CALTRANS STANDARD DETAILS	
TYPICAL DETAILS	_6_
VERDURA® RETAINING WALL PLANS	OF

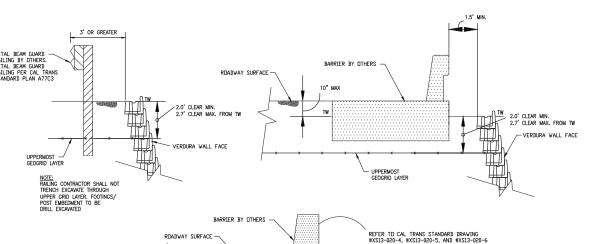


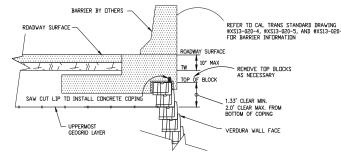
STEPPED BOTTOM OF WALL DETAIL



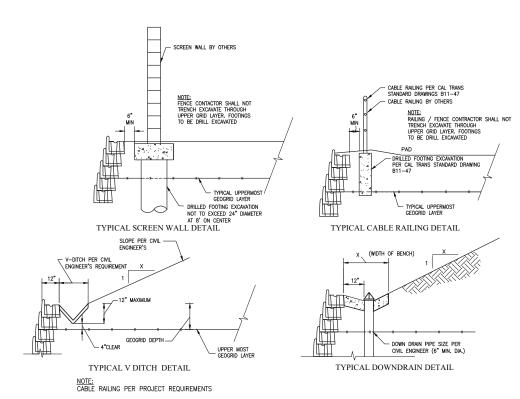
FACE PENETRATION DETAILS

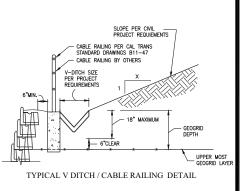






BARRIER DETAILS





TOP OF WALL DETAILS

SOIL RETENTION DESIGNSING.

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	WALL #		
××	xxx	××	xxx/xxx	××	1 /	
REGISTER	ED CIVIL EN	X/X/X DATE		LS * REGISTER		
The State of California or its officers or agents shall not be responsible for the accuracy or						

